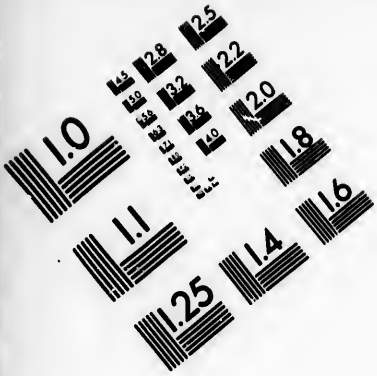



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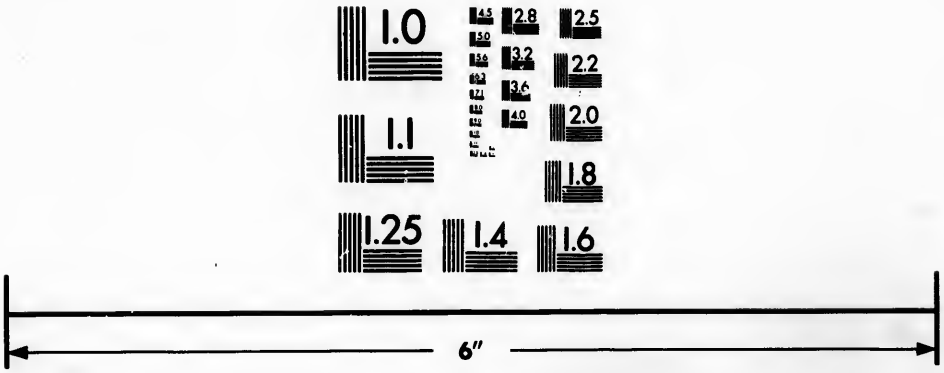



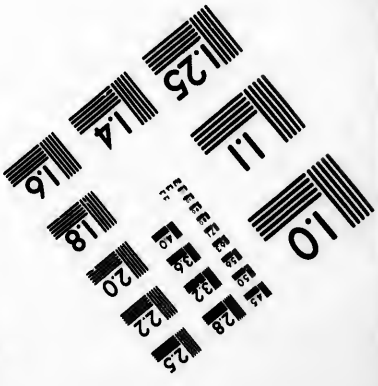


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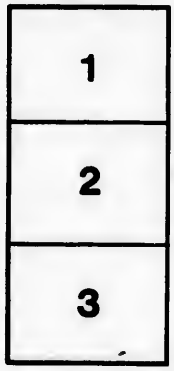


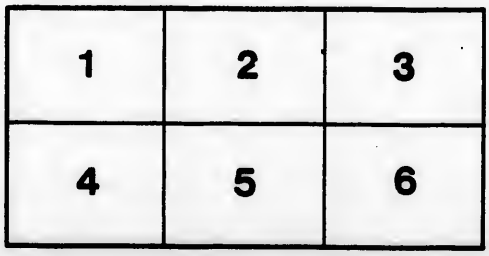

Cameron, K.

# A CASE OF GENERAL INFECTION BY THE BACILLUS PYOCYANEUS.

BY

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*Reprinted from the Montreal Medical Journal, March,* 1896.

KENNETH CAMERON, 1887.

# A CASE OF GENERAL INFECTION BY THE BACILLUS PYOCYANEUS.[1]

By KENNETH CAMERON. B.A., M.D.,

Assistant Surgeon, Montreal General Hospital; Assistant Demonstrator in Clinical Surgery, McGill University.

H. P., a male child, was born at the Montreal Maternity Hospital on August 4th, 1895, was nursed by his mother for twelve days, and left by her at the Montreal Foundling and Infants' Nursery. The infant weighed eight pounds and was well nourished; the stools were in good condition, yellow and free from curds. He was then fed upon a mixture consisting of milk, lime water and water, each one-third, with sugar of milk 3i to 3v. After the first week the stools became loose and watery, and contained more or less curd. This indigestion never improved, though the proportions of the mixture were frequently changed, and he gradually lost weight. The temperature, taken every four hours, ranged from 97° to 100½°. In no way did the case differ from one of atrophy with indigestion until September 16th (the fifth week) when a blue papule, 6 mm. in diameter, was noticed on the abdomen a little to the left of the umbilicus. A purulent discharge from the right ear was observed the same day. Two other small spots appeared on the abdomen. Later on, the whole surface of the body became slightly cyanotic. The muscles of the legs were rigid, but not markedly so, nor were the thighs flexed on the abdomen. The child died on September 23rd, or six weeks after birth. The temperature during the last week ranged from 94° to 99°.

A note was sent with the body to the pathologist asking him to especially look for the bacillus pyocyaneus, as some, but not all, of the symptoms of infection by that organism had been present. In the absence of Dr. Martin, the requisite observations were made by Mr. E. W. Hammond, of the McGill Pathological Laboratory, under the immediate supervision of Dr. Adami. From his notes it will be seen that the bacillus was found generally distributed throughout the organs.

This case is the third of a series of cases of general infection by the bacillus pyocyaneus, observed among the infants in the Montreal Foundling and Infants' Nursery during the past sixteen months.

The first two cases have been very fully reported elsewhere[2] by the late Dr. E. P. Williams and myself, but may be briefly repeated here for the sake of comparison.

CASE I.—A male child, nursed by his mother throughout his life.

[1] Read before the Montreal Medico-Chirurgical Society, November 29, 1895.

[2] *Journal of the American Health Association*, July, 1895.

He gained steadily in weight until the twenty-second week of age when he became restless and ill, and began to lose weight without assignable cause. Five weeks later diarrhœa set in, accompanied by abdominal pain and tenderness, and slight fever. After a week, a group of purple papules, 3 to 7 mm., appeared on the abdomen on each side, midway between the umbilicus and the flank; they then spread over the abdomen, chest and legs. The lower limbs became rigid, the legs were flexed on the thighs and thighs on the abdomen, and any attempt to straighten them out caused pain. Two days before death there was a profuse epistaxis and bleeding from papules between the toes, on the right thigh and on the back. A purulent discharge was also noticed from the left ear.

The autopsy was performed very shortly after death, and from the kidneys and spleen-pulp were obtained *pure* cultures of the bacillus pyocyaneus. Microscopical examination showed the capilliaries everywhere to be crowded with bacilli, which here and there formed emboli, and in some instances the micro-organisms had passed through the walls of the vessels infiltrating the surrounding tissue.

Case II.—A small poorly nourished female child was left in the Nursery, without her mother. She had a purulent discharge from both ears. There was a gain in weight for the first week, when she began to have diarrhœa and lose weight. She soon developed a general lividity of the whole body of a most pronounced type, and several pustules on the head, but no purpuric spots or cutaneous hæmorrhages were observed. Two days before death there was rigidity of the muscles. Cultures taken from the kidney, spleen and liver showed a *pure* growth of the bacillus pyocyaneus, and the microscopical appearances were identical with those seen in the first case.

Inoculations were made into rabbits from cultures taken from each child, and both the animals died within twenty-four hours with all the symptoms and lesions of acute pyocyaneus infection.

Very similar cases have been reported by Ehlers (*Hospitals Tidiende de Copenhague*, Mai, 1890,) and H. Neuman, (*Archiv. f. Kinderheilkunde*, Bd. XII., 1890). I am not, however, acquainted with original observations upon general infection with the bacillus pyocyaneus in children other than the cases by these two writers.

"The effects of the bacillus upon animals have been studied by several observers, notably Charrin, Ruffer and Babinsky. Charrin found that he could, by subcutaneous or intravenous injections of cultures, produce in rabbits a very characteristic disease, ending fatally, the symptoms and duration of the illness varying with the quantity and quality of the virus introduced. If a large dose, 0.50 to 1.00 cc., be injected into the vein of a rabbit's ear, the animal will

die in from twelve to twenty-four hours, the symptoms being loss of appetite, elevation of temperature, followed by a fall before death, diarrhœa, albuminuria, drowsiness increasing to coma, and sometimes convulsions. If, on the other hand, small repeated doses are given, a different train of symptoms appears. The disease becomes more chronic. Besides the albuminuria, diarrhœa, and fever, there occur rapid emaciation, cutaneous hæmorrhages and a peculiar form of spastic paralysis affecting usually the hind legs only ; the thighs are flexed upon the pelvis and the legs upon the thighs, which condition relaxes under chloroform ; handling the limbs gives the animal pain ; the muscles do not waste nor do they loose their electrical reaction. A few hours before death the paralysis becomes general. The post-mortem examination shows hæmorrhagic infarcts in all the organs and the specific organism may be easily demonstrated."

The close resemblance between the symptoms of this more or less chronic disease, produced experimentally in rabbits, and those observed in the infants, is very striking, and suggest that the cases reported are examples of the very rare condition—true pyocyanic disease.

The cardinal symptoms of this disease appear to be :

1. *Wasting.* This is usually very marked and rapid, and for it sometimes no cause can be assigned. In the case reported by Ehlers there was also mental depression.

2. *Diarrhœa.* Symptoms of gastric and enteric catarrh are always present and appear early. The stools are usually green, watery, and, in babies fed on milk, full of curds. Treatment seems to produce but little effect.

3. *Fever.* This is not high—the range being usually only two or three degrees, with a decided fall, often much below normal, before death.

4. *Albuminuria.* This is always present in rabbits, but no record can be found of this symptom in the human subject. This is probably due to the great difficulty of obtaining samples of the urine of very young babies. In the three cases here reported, repeated attempts were made to obtain a specimen but were unsuccessful.

5. *Rash.* In all the recorded cases there has been an eruption of bluish or purplish papules, chiefly on the abdomen, but also on the chest, limbs, head and mucous surfaces. The spots vary in size from 2 to 7 mm. in diameter, and there may be only a single one or a very great number. Sometimes they become pustular or bullous, the contents being of a bluish or brownish colour, and from them the bacillus can be cultivated. Sometimes a lividity of the whole body may be observed. This rash is the most characteristic symptom of the disease. Of the 68 infants that have died in the Nursery and have

been examined, but three have had such an eruption, and these are the three cases, here reported, of generalized infection.

6. *Muscular disorders.* These take the form of spastic paralysis, and occur late, after the development of the rash. The lower limbs seem to be the only parts affected. The thighs are flexed on the pelvis and the legs upon the thighs, and if straightened will return to the same position. Handling will make the child cry as if in pain. Before death there is general muscular relaxation.

## BACTERIOLOGICAL NOTES UPON DR. KENNETH CAMERON'S THIRD CASE OF GENERAL INFECTION BY THE BACILLUS PYOCYANEUS.

By E. W. Hammond.

[From the Molson Pathological Laboratory, McGill University.]

I am indebted to Dr. Adami for the opportunity of publishing the following notes:

The post-mortem in this case was made by Dr. Adami and myself. At the autopsy the infant was found to be small and greatly emaciated, the skin in general had an earthy, sallow appearance, and over the abdomen there was a small hæmorrhagic eruption, with, in addition, two larger, rather faded purplish spots. The abdomen was greatly distended and tympanitic, and upon opening it the bowels had a dark congested appearance. There was no fluid in the abdominal cavity, but the bowels were moist. There were no signs of any subserous hæmorrhages, and neither in the intestines nor in the other abdominal organs, save the stomach, were there any conditions noted differing from those seen in marantic infants. The abdominal organs in general had a dark congested appearance, the spleen was soft and relatively large, the lungs were also congested. In the stomach there were submucous hæmorrhages similar to those observed by Dr. Williams in the cases mentioned above, and similar to those seen also in the rabbit upon inoculation with B. pyocyaneus. I may state that I have seen several cases of such submucous hæmorrhages, both in animals inoculated in the pathological laboratory here and in animals inoculated by Dr. Ruffer at St. Thomas's Hospital in London.

I made cultures in beef broth from the subcutaneous tissue beneath one of the large purplish spots in the abdominal wall, from the heart blood and from the kidney, liver and spleen. Of these the culture from the abdominal wall resulted in a pure growth of the B. pyocyaneus, that from the kidney became turbid, but showed no characteristic greenish colouration; the heart blood and the liver developed slowly the characteristics of pyocyaneus cultures, but upon microscopical examination presented cocci along with the bacillus; the spleen showed admixture with cocci and putrefactive bacteria to an even greater extent. It may be added that the weather was distinctly

warm. The autopsy was not performed until at least twelve hours after death. As above stated, putrefactive bacteria were present in the cultures from the softened spleen. Whether the cocci found in the heart blood represented a post-mortem growth or the existence of a mixed infection I am not competent to determine. Their existence renders it impossible for me to state absolutely that this is to be classed as a case of pure pyocyaneus infection. It is, however, to be noticed that from the most characteristic lesion present, namely, from the purplish hæmorrhagic patch in the skin of the abdomen, the B. pyocyaneus was alone obtained. It was to be noted further that the greenish colour appeared more slowly in those tubes in which there was a mixed growth than in the culture from the subcutaneous tissue in which the pyocyaneus only was present. It would seem, therefore, that the presence of other micro-organisms had a retarding effect on the growth and colour production of the bacillus. I noted also that the character of the pigment production and the intensity of the peculiar odour developed by the cultures changed with further growth outside the body. Thus the first broth cultures direct from the organs had a more purely green coloration and slight odour. After making plate cultures on agar the cultures from the separate colonies made in beef broth assumed the more typical blue-green appearance, that usually seen. In fact the colour of the first growths was very similar to that of the non-pathogenic bacillus fluorescens when grown in broth. The odour also became very strong. That I was dealing with the B. pyocyaneus was, however, shown by the appearance of the micro-organism under the microscope and by the results of inoculation. Upon November the 25th I inoculated a three-months-old rabbit intravenously with 1 ccm. of a broth culture twelve days old, made from a colony upon an agar plate from the original culture from the heart blood. The animal died in fourteen hours. At the autopsy, with death in so short a time partaking of an intoxication rather than an infection, it was not to expected that the animal would show many gross lesions. There were, however, hæmorrhages in the ear at some distance from the seat of inoculation, and hæmorrhages again in the mucous coat of the stomach, as also interstitial hæmorrhages in the lung. Sections of the spleen and liver showed the bacilli present. I should add that a microscopical examination of the organs of the child showed the characteristic small bacilli to be present in the spleen, liver and heart wall. From the heart, liver and spleen of the rabbit I obtained again pure cultures of the bacillus giving a rich pale blue colour.